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"Matrices connected with the invariants of the equation of the second degree." Dr. J. A. BULLARD, U. S. Naval Academy.

RALPH E. ROOT, *Secretary*.

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### MEETING OF THE KENTUCKY SECTION.

The Tenth Annual Meeting of the Mathematics Section of the Kentucky Colleges and the Second Annual Meeting of the Kentucky Section of the Mathematical Association of America, was held at Georgetown College, Georgetown, Ky., May 11, 1918, in the Physics Lecture Room, Physics Building. The chairman, Prof. A. L. Rhodon, in a few words welcomed the members and visitors. The program with brief abstracts follows.

"Illustrated Lecture on Snowflakes." D. W. Martin, Professor of Physics, Georgetown College, assisted by Mr. C. V. Mullins.

Prof. Martin gave a brief account of the earliest work in snowflake photography by J. G. Greenough of Jericho, Vermont. Many slides were shown and attention was especially called to the pronounced hexagonal shape of the flakes, there being only one exception to this.

"Photogrammetry." Mr. V. G. Grove, University of Ky.

Photographic principles were first enunciated by Beaumont-Benoit in 1791-1793. Following the invention of the sensitized plate, Colonel A. Laussedat in 1864 published the first work on photographic surveying. In 1865 A. Meydenbauer published applications to architecture. Guido Hauch then (1884) gave a graphical construction of a third perspective from two given ones. S. Finsterwalder laid the foundation of photogrammetry. Besides these, practical surveyors used photogrammetric methods to aid them in mapping mountainous regions. The two cases of one and two perspectives were discussed; the perspective being either vertical or inclined. The problems of orientation, graphical construction, reconstruction of an auxiliary figure, were given. An analytical expression for the coördinates of the space point in terms of the coördinates of the images was obtained. G. Hauch's construction of a third perspective was then discussed and it was shown that this subject has a very wide application.

"The Decipherment of Military Code Messages." H. R. Phalen, Berea College, Berea, Ky.

The speaker showed by some dozen large printed sheets the various methods of enciphering military code messages. All messages are divided into two great classes: transposition and substitution. In the first case the letters are simply rearranged according to some predetermined scheme, but each letter represents itself; that is, "a" means "a" and "k" means "k" wherever they are found. Consequently the vowel and consonant frequencies will be the same in this type of message as they are in any ordinary page of reading matter. Of this transposition type messages were presented in the simple vertical, diagonal, spiral, keyword and route cipher methods involving English, German, French and Spanish texts. The other great class is the substitution class where letters are

interchanged in their alphabetical position and where the vowel and consonant frequency tables are useless. Under this type the most interesting point was the construction of a military message by the method of the famous Playfair Cipher of the British army.

"A Generalization of the Mean Value Theorem." H. H. Downing, University of Ky.

The conditions of  $0 < \theta < 1$  and  $0 < h$  were removed and several functions were examined to find a relation between  $\theta$  and  $h$ . For the function  $ax^3 + bx^2 + cx + d$  we set  $\varphi = \theta h$  and substitute the function in

$$\frac{f(x+h) - f(x)}{h} = f'(x + \varphi),$$

and obtain the equation

$$ah^2 - 3a\varphi^2 + (3ax + b)h - 2(3ax + b)\varphi = 0.$$

This is seen to be an ordinary hyperbola with transverse axis vertical and the hyperbola passing through the origin. ( $\varphi$ -axis vertical,  $H$ -axis horizontal.) The straight lines  $\varphi = 0$ ,  $\varphi = 1/3 h$ ,  $\varphi = 2/3 h$ ,  $\varphi = h$ ,  $\varphi = 4/3 h$ , are the loci, respectively, of a focus, vertex, center, vertex and focus.

Prof. E. L. Rees was elected chairman for the year 1918-1919 and the present secretary was reelected. The secretary's report was then given. Regret was expressed at the absence of Prof. W. H. Garnett, Wesleyan College, Winchester, Ky., and Prof. Henry Lloyd, Transylvania College, Lexington, Ky., both caused by illness. Regret was also expressed that Prof. H. R. Phalen was leaving the state.

Those present during the meetings were: A. L. Rhoton, David W. Martin, Georgetown College; G. C. Crooks, Center College; H. R. Phalen, Berea College, J. M. Maxey, Asbury College; P. P. Boyd, J. M. Davis, E. L. Rees, V. G. Grove, H. H. Downing, University of Kentucky.

H. H. DOWNING, *Secretary*.

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## BOOK NOTICES.

SEND ALL COMMUNICATIONS ABOUT BOOKS TO W. H. BUSSEY, University of Minnesota.

The number of books in the English language on the theory of functions of a complex variable continues to grow. One of the latest is "Functions of a Complex Variable," by Thomas M. MacRobert, Lecturer in Mathematics in the University of Glasgow. It is published by Macmillan and Co., London. The book is designed for beginners who have acquired a good working knowledge of the calculus. In order to make the subject not too difficult for beginners, the author has abstained from the use of strictly arithmetical methods and, while endeavoring to make his proofs sufficiently rigorous, he has based them mainly on geometrical conceptions.

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